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THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XI | NOVEMBER, 1938 | No. 9

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Muncie Sees Story of Steel In Technicolor

Fine Example of Industrial Film Makes Complicated Processes Easily Understandable

By Jack L. Coyle

Muncie Chapter—Presentation of the new United States Steel Corp. motion pictures, "Steel—Man's Servant," in technicolor, and "USS Cor-Ten," was made the occasion for the annual Ladies' Night of the Muncie Chapter.

The Chapter took the occasion to express its sorrow at the death of its best-liked member and staunchest supporter, Axel Halvorsen. Mr. Halvorsen, who was chairman of the local group through the 1937-38 season, died suddenly on Oct. 4. His death is an irreparable loss to the Chapter.

The first film showed the development of a steel with the special requirements of strength, corrosion resistance, abrasion resistance, and impact resistance.

Freight cars have always been a large item on the maintenance bill, particularly coal cars. Cor-Ten, developed by the United States Steel Corp., not only meets these requirements satisfactorily but is so strong that the weight of the average coal car can be reduced as much as 26%.

Its resistance to corrosion is four to six times that of plain steel. It can be subjected to all machining operations, and can be easily welded.

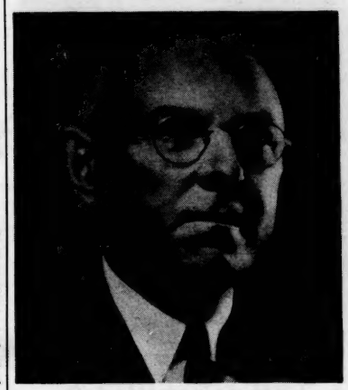
Its use has spread from coal cars to truck bodies and locomotive boilers, and it is finding new uses in the marine field daily.

The feature attraction of the evening, "Steel—Man's Servant," was well received by the audience. This is the first complete industrial film ever produced in sound and color, and the re-

(Continued on page 7)

ARE YOU taking full advantage of the A.S.M. Employment Service? . . . Read the ads on page 8. Many good men are now available. Many have been placed by ads such as these. If you need help, write the Employment Service Bureau, care of A.S.M.

A.S.M. Heads Take Office at Congress



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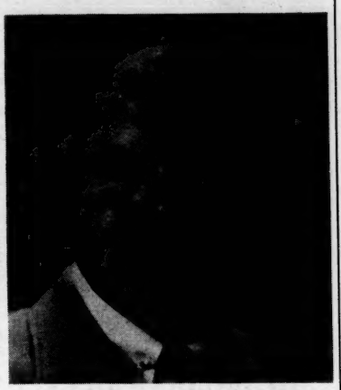

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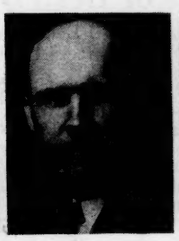
W. H. Eisenman Secretary

D. S. Clark Trustee



F. B. Foley Trustee

S. L. Hoyt Trustee

Now heading the American Society for Metals is William Park Woodside, Vice-President, Climax Molybdenum Co., who was declared elected as president at the National Metal Congress last month.

Others who took office during the Congress are James P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., vice-president; W. H. Eisenman, re-elected secretary; and Donald S. Clark, associate professor of mechanical engineering, California Institute of Technology, and Francis B. Foley, superintendent of research, Midvale Co., elected as trustees for a period of two years each. Samuel L. Hoyt, director of research, A. O. Smith Corp., has been appointed to fill out the unexpired year of Mr. Gill's term as trustee.

Other officers are Bradley Stoughton, treasurer; G. B. Waterhouse, past president and trustee; and H. A. Anderson, trustee.

Compliments

To Zay Jeffries, past-president A.S.M., president Carboloy Co., G. E. subsidiary, on his election as a member of the corporation of Case School of Applied Science, Cleveland, where he taught for several years.

To Fred Grotts, formerly vice-president, Lebanon Steel Foundry, on his appointment as vice-president, Chicago Steel Foundry.

To A.S.M. President William Park Woodside on the plaque presented to him by the Detroit Chapter on the occasion of the 25th anniversary of the founding of the Steel Treaters' Club, a forerunner of the American Society for Metals.

To Robert B. Sosman, physical chemist, United States Steel Corp. Research Laboratory, pyrometry lecturer at the recent National Metal Congress, on his appointment to membership in the Bartol Research Foundation Comittee of the Franklin Institute.

To Leon H. Scheifele, past secretary-treasurer Lehigh Valley Chapter, formerly metallurgist and tool supervisor for the Reading Co. and Central Railroad Co. of New Jersey, on being named engineer of tests, Reading Co.

To the Los Angeles Chapter on being awarded the President's Bell and gavel for outstanding chapter service (notably for educational work and assistance in making the Western Metal Congress and Exposition held in Los Angeles last March a success).

Less Than One Ounce of Aluminum Used For Reflecting Surface of 200-In. Mirror

By F. D. Steinway

Milwaukee Chapter—The first meeting of the 1938-39 season was held on Sept. 15 with P. V. Faragher of the Aluminum Co. of America furnishing a very interesting talk on "Aluminum and Aluminum Alloys."

Dr. Faragher sketched the history of the metal and its extraction from its ores, and then presented the physical properties of the metal and its alloys. He pointed out that the lightness and excellent corrosion resistance of aluminum with certain media, together with the improved mechanical properties of the newer alloys, account for a major part of its use in industry.

An interesting highlight of the talk was the use of less than one ounce of aluminum in providing the reflecting surface on the mirror of the 200-in. telescope at Mt. Wilson Observatory. The aluminum film, which is applied by a vaporization process, is superior to silver in that it does not tarnish, and it reflects the ultra-violet range of the spectrum. Practically all sun lamps have aluminum reflectors because of this property.

H. C. Brockel, secretary of the Milwaukee Harbor Commission, presented the coffee talk and explained the meaning of the purchase of the 50 acres of the Carnegie-Illinois Steel Corp. land to the future development of the Milwaukee lake front.

Metal Cutting Group Studies Chip Formation

Three Types of Chips Shown in Formation by Motion Pictures Taken Through Microscope

By M. Martellotti

Cincinnati Chapter—"Recent motion pictures taken through the microscope showing some aspects of metal cutting tool action" was the subject discussed at the first meeting held Oct. 6 by the Metal Cutting Group of the Cincinnati Chapter.

Hans Ernst, research director of the Cincinnati Milling Machine Co., the leader of the discussion, presented the subject in a typically original, interesting and understandable manner.

We have learned a lot about speeds and feeds, said Mr. Ernst in his introductory remarks, but in order that we may meet the increasing demands of modern production for greater output and higher quality of finish, it is necessary that we obtain a clear understanding of what is taking place at the cutting edge of the tool.

Misconceptions Cleared Up

After mentioning some of the misconceptions of metal cutting tool action, both in the shop and in the technical literature, Mr. Ernst began to unfold the story of what is going on at the cutting edge of the tool by showing motion pictures taken through the microscope of the process of the formation of three types of chips:

Type 1—Discontinuous chip.

Type 2—Continuous chip, with continuously escaping built-up edge.

Type 3—Continuous chip with built-up edge adjacent to the tool face.

The type 1 chip, which is the most

(Continued on page 8)

Proper Heating & Cooling Remedies "Tender Steels"

By Herbert M. Frazier

Washington Chapter opened its fall and winter season with a dinner meeting and had as its guest speaker Paul E. McKinney, metallurgical engineer of Bethlehem Steel Co.

The subject of his discussion was steel with low alloy additions. He called attention to the special characteristics that are demanded of steel makers to meet present day exacting applications.

He showed by means of thermal charts the reason why some of our low alloy commercial steels are so-called "tender steels" and how this condition can be avoided by proper control of heating and cooling procedure.

A lively discussion ensued from Mr. McKinney's question, "Are engineers utilizing what they pay for in alloy additions?" He showed that they are not, when striving for high tensile value with little or no regard for proportional limit or yield strength.

By illustrations including micros of specimens in process of machining and by results of creep tests with steels of varying grain size, he showed the fallacy of ordering steel to composition and physical properties without some thought as to service requirements.

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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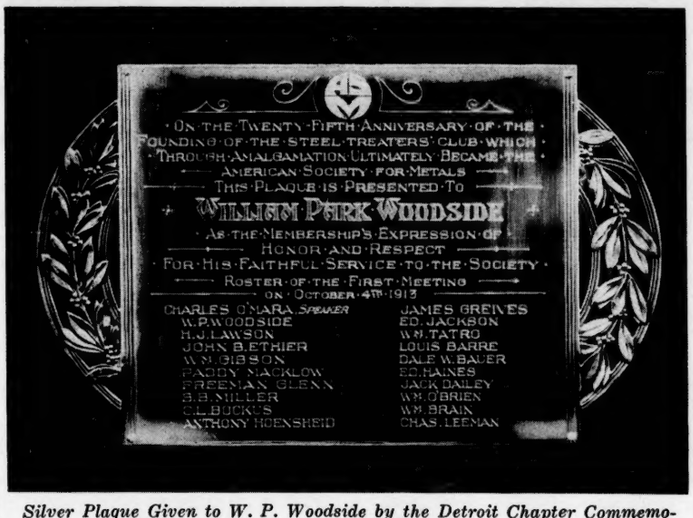
Plaque Presented to Founder Woodside



Silver Plaque Given to W. P. Woodside by the Detroit Chapter Commemorating the First Meeting of the Steel Treaters Club, A.S.M. Predecessor

Attacks Tool Steel Problems of Wrong Design or Application

By William G. Slack

Syracuse Chapter—A talk on "Tool Steels" by S. C. Spalding, metallurgical engineer, American Brass Co., Waterbury, Conn., opened the 1938-39 season on Tuesday, Sept. 13.

Mr. Spalding began by classifying the various types of tool steels in four groups: Carbon tool steels, oil hardening tool room steels, low alloy steels, and high alloy steels.

Starting with the carbon tool steels, Mr. Spalding described the various applications for which they are best suited.

The common difficulties that are encountered in treating intricate or heavy sections of these steels led to a consideration of the oil hardening tool room steels. The deep hardening and non-deforming characteristics of this group were stressed.

For specific properties the speaker explained the selection of one of the low alloy steels. All steels in this group have a total alloy content of less than 6% and in it may be found steels for almost any use.

The high alloy group consists of such steels as high carbon, high chromium and the various types of high speed. Many of these are for high temperature application—either as hot forming dies or as cutting tools subject to frictional heat developed by heavy, fast cutting.

Quenching Hazards Discussed

Mr. Spalding next took up the design of tools. The effect of surface finish, notches, radii of fillets, sharp and rounded keyways and transverse holes, on the endurance and impact values was shown by means of a group of slides.

Another group of slides showed the effect of light and heavy sections in a single tool. Methods of reducing the quenching hazards caused by such design were advanced.

In closing, Mr. Spalding showed a series of pictures of various tools, some of which failed in quenching or in service due to localized stress. The manner in which the tools were redesigned or specially quenched to eliminate these troubles was discussed.

Mr. Spalding in his interesting and practical talk, made a direct attack on the troubles of the tool heat treater which are due to improper design or wrong application.

Chicagoans Cheered by Van Deventer's Prophecies of Better Business for 1939

Editor Speaks on "Metal Economics"; Gives Reasons for Increase in business of Which Steel Industry Is Barometer

By Alfred R. Conti

Chicago Chapter—On Oct. 13, 153 members and guests did justice to an excellent duck dinner. This was followed by high class entertainment furnished by a local blues singer. As the piano got warm she got hot and ended sentimentally singing about her grandmother.

With an evening so famously started it was but fitting to have Robert S. Archer, technical chairman, introduce the speaker of the evening. Mr. Archer with great ease took our minds off the past entertainment and placed it in a tempo fitting that of the speaker.

Bob then, without further ado, introduced J. H. Van Deventer, editor of *The Iron Age*, who gave a discourse on "Metal Economics" which will long be remembered.

Because of the large scope of the subject and the limited time in which to cover it, Mr. Van Deventer concentrated most of his thoughts on the conditions in this country and their effects on iron and steel.

Foreign Armament Helps Business

In passing over the foreign situation, he stated that "Hitler won the war that Chamberlain prevented," and it is Mr. Van Deventer's belief that Hitler thinks he is the second Napoleon which consequently makes the other nations carry on a heavy armament program. This should have a good effect on business in this country.

Our steel industry is the barometer of our business and where it goes business goes. Just now it went to the wrong place.

We have, as users of steel, the big three (auto, rail and construction) which consume approximately 50%, the other half being used by an unclassified trade. This unclassified group is the pulse of our industry, for it represents the fact that we are producing new products which are the realization of new ideas.

Mr. Van Deventer gave several reasons for an expected increase in business in 1939, such as the following:

Railroads to Rebuild

1. By the first of the year the railroad industry will have settled its labor disputes and will start rebuilding old equipment and building new in order to meet present competition.

2. By Jan. 1, 1939, the building and construction line should show a much-waited-for increase.

3. During next year there will be a heavy foreign armament program.

4. The production of new products which have just been developed will also be in full swing by 1939.

The only thing that may slow up economic progress is the national debt with its heavy load on industry, but even this can be easily conquered with full cooperation from all.

The Chicago Chapter feels greatly indebted to Mr. Van Deventer for his splendid address and hopes that his prophecies will come true.

Stoughton Tells About New Developments

By H. C. Meyers, Jr.

Philadelphia Chapter opened the 1938-39 season on Sept. 30 with a program centered on a talk by Prof. Bradley Stoughton, dean of the College of Engineering of Lehigh University and national treasurer of the A.S.M.

His subject was "New Metals—New Applications" in which he outlined the recent developments in the entire field of metallurgy, stressing such subjects as better control of grain size in steel, the improvements in powder metallurgy, and the multitudinous uses to which the lighter metals are being put.

The Philadelphia Chapter was especially pleased to have Dean Stoughton as speaker in view of the fact that 15 years ago at the first meeting of that season he was the principal guest of the evening.

Following Dean Stoughton's talk the U. S. Steel Corp. movie "Steel—Man's Servant," was shown. The picture, in color, proceeds from the ore mines through every process in the manufacture of steel down to the finished product. Everyone present thoroughly enjoyed the film and agreed that its reputation of being the best industrial movie yet produced is well deserved.

The meeting was held in the Auditorium of Temple University in recognition of the 18th season of the Special Course in Heat Treatment and Metallography sponsored jointly by the Philadelphia Chapter of the A.S.M. and that University.

As an added attraction many of the sustaining and other members provided interesting and instructive exhibits from which there was no little trouble in prying the members at the opening of the meeting.

Detroit Chapter Commemorates A.S.M. Origin

Celebrates 25th Anniversary of First Meeting of Steel Treaters Club in Detroit

By V. A. Crosby

Detroit Chapter—Commemorating the 25th anniversary of the founding of an organization which later formed a part of the American Society for Metals, more than 125 members of the Detroit Chapter and their wives and friends attended a dinner meeting at the University of Michigan—Michigan State football game at Ann Arbor on Oct. 1.

The highlight of the meeting was the presentation of a silver plaque to William Park Woodside, president elect, A.S.M., who assumed office on Oct. 19. The plaque bears the names, in addition to Mr. Woodside, of the 18 men who met in downtown Detroit at the old Fellowcraft Club, on Oct. 4, 1913, to listen to a talk by Charles O'Mara.

First President Makes Presentation

The inscription on the plaque given to Mr. Woodside reads:

> "On the twenty-fifth anniversary of the Steel Treaters' Club which, through amalgamation, ultimately became the American Society for Metals, this plaque is presented to William Park Woodside as the membership's expression of honor and respect for his faithful service to the Society."

The plaque was presented to Mr. Woodside by Colonel A. E. White, first president of the Society and director of engineering research, University of Michigan.

In responding, Mr. Woodside thanked the members and took advantage of the occasion to tell the group many interesting facts about the early history of the organization and its relation to the iron and steel industry. Reading over the first roster list of 20, Mr. Woodside told what had since become of each member of the Club.

Other Old-Timers Present

In addition to Mr. Woodside, Dale W. Bauer and Louis Barre of the original founders' group were present at the meeting. C. Neumann Dawe, the first technically trained member to read a paper before the Society, was also presented to the group by Mr. Woodside. William H. Eisenman, executive secretary of the A.S.M., was called on for a few well-chosen remarks.

The meeting was the first held by the Detroit Chapter to which members' wives were invited. H. T. Morton, metallurgist for Hoover Steel Ball Co., was in charge of arrangements and A. L. Boegehold, chairman of the Detroit Chapter, served as toastmaster.

At the speakers' table were Mr. Boegehold, Mr. and Mrs. Woodside, Mr. and Mrs. Morton, Mr. Eisenman, Colonel White, and Professor and Mrs. Dwight L. Dumond. Total attendance was about 250.

The principal address of the evening was given by Prof. Dwight L. Dumond of the University History Department, who discussed "Some Reactionary Aspects of the New Deal Philosophy."

Asimow Comes Thru With Hit Under Difficulty

Pinch-Hitting for Grossmann on Hardenability, Chicago Lecturer Overcomes Lights, Loud Speaker, Projector

By Alfred R. Conti

Chicago Chapter again honored its past chairmen on Sept. 8. The former heads of the Chapter were treated like royalty, served with food fit for a king and entertained by none other than Count Anton Carlson.

The highlight of the evening was slightly dimmed when it was announced that Dr. Marcus A. Grossmann was ill, and would be unable to present the address on "Hardenability." This disappointment was not only felt by the members and guests, but the loud speaker, electric lights, and slide-projector seemed dejected and would not function properly.

It was under a handicap like this that Dr. Morris Asimow, a co-worker with Dr. Grossmann, and a co-author of the paper on "Hardenability," pinch-hit. Unlike most pinch-hitters, he came through with a hit in a very difficult spot.

Core Diameter Is Key

Dr. Asimow pointed out that when a series of rounds of a given steel is heated and quenched, all in the same way, the hardness penetration will vary with the size, so that after the critical size (the size which just hardens through) for the particular steel and quenching medium is exceeded, the hardened rim becomes thinner or, conversely, the diameter of the unhardened core grows larger.

The relationship of the unhardened core to the diameter of the sample is an insight into the hardenability of the steel and to the severity of the quench.

A similar relationship can be derived from the theory of heat transfer on the assumption that equal hardness values will result for a given steel whenever the half-temperature time in cooling is the same. This results in a series of curves which correspond very closely to experimental curves.

It is also possible to derive the quenching power of a quenching medium by this method. It was shown that the more drastic the quench the less rapidly does the diameter of the unhardened core increase.

Applicable to Any Quench

Another series of curves was shown which enabled translation of results on any steel to quenching media of any power. Knowing by experimentation where one sample falls on one of the curves, it is possible to tell how any other sample of the same steel will act when hardening it in any medium.

Also by knowing the diameter of a sample and the diameter of the unhardened core, it is possible to tell the quenching strength of the medium and it is possible to locate its curve on the series. One can also determine the critical size of the steel in any quenching medium.

In addition, the effects on hardenability resulting from variation in carbon, manganese, phosphorus, silicon, and aluminum were discussed and actual data quoted.

The Chicago Chapter is indebted to the Publication Committee of the A.S.M. for the permission granted for this preview of the paper to be presented at the National Metal Congress. We are also very grateful to Dr. Morris Asimow for his splendid address under the most trying of circumstances.

Banquet Speakers at Metal Congress

Past President E. C. Bain, Speaker B. F. Fairless, President G. B. Waterhouse, President-Elect W. P. Woodside and Frederick J. Griffiths, Formerly President, Timken Steel & Tube Co., at the Speakers' Table, A.S.M. Annual Banquet, Oct. 20. Perhaps the pleased expression reflected on the faces of the three A.S.M. presidents is occasioned by the fact that they are attending one of the largest and most successful National Metal Expositions in the history of the Society.

Rolla Students Make Field Trip to Expo

By Max Bolotsky

Missouri School of Mines Group—In accordance with the custom of the metallurgy department of the Missouri School of Mines, the senior students in metallurgy under the supervision of Prof. C. Y. Clayton made the National Metal Congress and Exposition (Detroit) the goal of their annual field trip.

Four days were spent in attending the technical sessions and in viewing the various exhibits. An alumni luncheon was participated in by the group on Oct. 19; among those present were James P. Gill, vice-president of A.S.M., and E. E. Thum, editor of METAL PROGRESS, the latter as a guest of the Rolla alumni.

Several plants were inspected during the trip, among which were the River Rouge Plant of Ford Motor Co. and the research laboratory of the Climax Molybdenum Co. At the latter, the student-visitors were given a talk by the vice-president of the company, and A.S.M. president, W. P. Woodside.

As a result of the trip, several speakers who are prominent in the metal industry are expected to visit the School of Mines at Rolla later in the year to address the local student chapter.

Activities of the chapter began this fall on the week-end of Oct. 7, when the members attended sessions of the second regional conference of the St. Louis Chapter of the A.F.A., which was held on the campus.

On Oct. 21-22, the group, working in union with the local student section of the A.I.M.E., assisted in putting through the plans of the first annual Missouri Mineral Industries Conference, held in Rolla, and sponsored jointly by the School of Mines and the State Geological Survey.

Scomet to Handle OFHC

The Scomet Engineering Co. has taken over the work formerly carried on by the Oxygen-Free Copper Department of the United States Metals Refining Co.

The various types of OFHC will be produced at Carteret, N. J., and the American Metal Co., Ltd., New York, will handle the sale of the metal.

The personnel of the organization remains unchanged.

Wyman Speaks on X-Rays

By C. B. Brodie

Schenectady Chapter—The first regular monthly meeting was held Oct. 25 at the Van Curler Hotel. L. L. Wyman of the General Electric Research Laboratory was the speaker and his subject was "X-Ray Diffraction."

His presentation of this subject thoroughly covered the fundamentals of diffraction of light, X-ray diffraction, diffraction patterns and some of the practical applications of X-ray diffraction methods.

Cleveland Safety Executive Speaks on Traffic and Crime; Steel Movie Shown

By L. F. Herron

Cleveland Chapter inaugurated the new season with a fine turnout at the Cleveland Club on Oct. 3. Coffee talker of the evening was Robert W. Chamberlin, executive secretary of the Cleveland Safety Department.

Mr. Chamberlin, after giving an amusing definition for a metallurgist, analyzed the results obtained in a study of traffic accidents, and the means worked out for their reduction. He stated that 15% of the drivers cause 90% of all accidents, and that certain locations have high accident rates until preventive measures are taken.

Mr. Chamberlin then explained the new methods for crime prevention, and the operation of the Department with two-way radio equipped patrol cars and fewer precinct stations. He was roundly applauded for his excellent presentation.

Paul B. Gilroy, sales manager, Cleveland District, American Steel and Wire Co., then spoke of the difficulties, particularly lighting, encountered in making the picture, "Steel—Man's Servant," the first complete industrial picture to be produced in sound and color.

The picture itself was a marvelous production from any point of view, showing the mining, transporting, refining, rolling and fabrication processes (see report on page 1).

Sound, color, and the narration of Edwin C. Hill all helped to give a technically accurate picture with a great deal of popular appeal, as was attested to by the enthusiastic applause of the 600 members and guests.

Oregon Hears About Winches, Hoisting Gear

Three Members of Firm Trace Growth, Describe Production Methods, Design Problems

By G. E. Healy

Oregon Chapter—Attendance at the first monthly dinner meeting on Sept. 9 was encouraging; 58 were present for the dinner and 10 or 12 more came in later to hear the speakers.

Chairman Ulrich announced various committee appointments and Professor Sam Graf, chairman of the Educational Committee, reported that his committee had met and that they had considered the question of again presenting the Bates Course on Ferrous Metallurgy. Fourteen of the members present signified their desire to take the course, if given.

Ede Gives Company Background

G. M. Ede of the Willamette Hyster Co. was then introduced and took charge of the meeting. He introduced Ernest Swigert, president, and Collis Johnson, vice-president of the Willamette Hyster Co., and then went on to trace the growth of the company.

This firm now specializes in the manufacture of winches and hoisting equipment for Caterpillar tractors and has the cooperation of that company which gives it world-wide distribution. It employs at normal capacity approximately 240 persons whose annual payroll amounts to nearly one-half million dollars. Sales last year were 1200 units, 20% of which went to foreign countries.

Maurice Hooff, factory manager, next outlined the methods of production and heat treating used at the plant. He stated they are constantly striving to improve the methods of manufacture and outlined their time study methods, types of machines and metals and heat treating required.

New Tractors Involve Winch Problems

D. J. McNeill, chief engineer of the Willamette Hyster Co., told of the problems involved to develop new models of tractor winches as new models of tractors are developed. They are now manufacturing 20 to 30 models of winches for five current models of Caterpillar tractors.

While the tractor winch was developed originally for logging purposes, other industries have found use for them and sales have been made to pulp mills, for oil field construction, circus use, and at airplane hangars.

A resume of the routine of engineering study necessary to develop a new model was given in which Mr. McNeill showed that the factors to be considered are the service in which the winch is to be used, the probable market, the cost, space limitations on the tractor, weights to be handled and speed of handling, and the cooperation of the shop in making the layout.

Trial Units Built

After approval, a trial unit is built and given a field trial, field observations are made and any necessary improvements made before going into production.

Mr. McNeill displayed and explained examples of the scale models used in making static studies of the operation of the winches before manufacture.

Chairman Ulrich presented Prof. Sam H. Graf with a very fine woolen blanket as a gift from the members in recognition and appreciation of his work as chairman of the local chapter from its formation in February, 1937, until May, 1938.

Chapter Officials and Guests Gathered to Honor Dr. Sauveur

At the Speakers' Table, Boston Chapter Meeting, Oct. 7: George Burnett, Chairman, Educational Committee; Grant Wheat, Coffee Speaker; Arden L. Knight, Vice-Chairman; Albert Sauveur, Principal Speaker and Honored Guest; Mrs. George B. Waterhouse, Wife of Past National President; Miss Mary Norton, Bona-Fide Member of Boston Chapter; Howard Handy, Secretary.

Running Comments and Slides Describe Factors That Affect Heat Treating Results

McQuaid's Slides Show Reduced Cooling Rate With Increased Carbon, Relation of Case Depth, Time and Temperature

By J. W. McBean

Ontario Chapter—The opening meeting in the Royal York Hotel, Toronto, was a bumper one assembled to hear H. W. McQuaid of the Republic Steel Corp. talk on "Factors Affecting the Results Obtained in Heat Treating Commercial Steels."

Mr. McQuaid gave a series of running comments accompanying a large number of slides. These included diagrams illustrating the reduction of critical cooling rate with increased carbon content of a steel, relation between case depth, time and temperature, various microstructures, and typical defects developed in service.

Because of the relation of surface to mass, large carbide particles dissolve and diffuse more slowly than small ones, and it is therefore an advantage to have the carbides in a fine state before quenching operations.

In carburizing at high temperatures the carbon diffuses rapidly into the steel and therefore gives a good depth of case, but the surface layer is not as rich in carbon as though a lower temperature were used. At 1500° F. a surface very high in iron carbide is produced, and to get great wear resistance the depth can be obtained by using a final carburizing temperature of 1500° F. for a hard surface.

Aluminum Gives Shallow Hardening

The proper use of aluminum in steel manufacture gives shallow hardening and boundaries low in carbon. Carbon dissolves more readily in the grains than in the boundaries and this is accentuated in aluminum killed steels.

A good illustration of the effect of grain size on impact resistance is given by two steels of the same composition, namely, 0.40% C, 0.80 to 0.85% Mn. Steel A had a fine grain (No. 7 to No. 8) and steel B a coarse grain (No. 1 to No. 2). Both were quenched in water from 1500° F. and drawn at 800° F. Steel A showed 62 ft-lb. Izod and steel B only 10 ft-lb. at the same Brinell.

The effect of rolling temperature is important. With a low rolling temperature (above the critical point) the grains are broken up, producing a tough steel, but the metal is not easily machined.

With a high finishing temperature, the grain is left coarse, giving a relatively brittle steel which can be readily machined. Hot finishing in the bar mill followed by cold rolling gives high machinability.

In one case quoted the steel was rolled at about 2400° F., which increased the life of the cutting tools between grinds from 3 or 4 hr. to 40 hr., and a later rolling temperature of 2300° F. gave a life of 12 to 15 hr.

Stress Concentrations Important

Other things besides the kind of steel and its treatment have to be considered in getting good service, one factor being high stress concentrations due to sudden changes in diameter.

For instance, a large truck transmission did not give as good service as a smaller one because of low rigidity caused by the large distance between shaft bearings.

Pitted gear teeth may be adversely affected by thin oil, since the pressure is sufficient to force the oil into slight surface cracks and imperfections and increase the damage, while the rubbing surfaces have no lubrication.

Molybdenum, chromium and vanadium act as surface stabilizers, and in one case a 4615 steel ran three times as long as one without molybdenum.

One of the best features of Mr. McQuaid's talk was his efficient answering of a large number of questions during the discussion period.

Powdered Metals Display Supplements Hardy's Talk

By R. J. Haigis

Hartford Chapter—While many of the local boys could undoubtedly give quite a discourse on the properties, hardening power, etc., of powders such as Lady Esther, Coty, and others, it remained for Charles Hardy of Charles Hardy, Inc., to initiate them into the rapid advances of "Powder Metallurgy."

Mr. Hardy based his talk on a paper which is soon to be published on the "Fundamentals of Powder Metallurgy," thus giving the members a chance to absorb at their leisure knowledge on a subject which catches the imagination as few others will.

Mr. Hardy supplemented his talk with a large display of parts made from various metallic and non-metallic powders and these were the center of interest at the conclusion of his talk and a lively discussion period.

Although this was the first meeting of the new season there were about 130 members and guests in attendance, which is a good indication that interest in the activities of the A.S.M. is not lacking around Hartford.

Old 'Proceedings' Wanted

The library of the American Society for Metals has never possessed Volume I of the *Proceedings* of the Steel Treating Research Society, which it should have to complete the set of its publications. If any member of the founder Detroit society has this volume, or any of the separate early numbers, that he cares to dispose of, a note to that effect would be appreciated by

The Librarian
American Society for Metals
7016 Euclid Ave., Cleveland.

Metallurgy Important Factor Even in Early Airplane Engines

By M. J. Donachie

Springfield Chapter rang up the curtain on the 38-39 season's activities with a dinner and meeting at the Hotel Worthy. A large turnout to both the dinner and meeting indicated a successful season is in store for the Chapter.

The evening's address was delivered by H. J. Fischbeck of Pratt and Whitney Aircraft Co. of Hartford, Conn. The subject presented was the "Metallurgy of Aircraft Engines."

Starting with the historic plane of the Wright Bros., and its epic-making performance, the speaker made it at once apparent that metallurgy even at that early date was a prominent factor in the manufacture of airplane engines.

The development of planes and the remarkable growth of the aircraft industry was soon exacting heavy demands of the metallurgist. More strength, less weight, and greater power demands sent metallurgists seeking newer applications for already tried and proven materials, and investigating the possibilities of those as yet untried. The result of this was the utilization of a wide range of metals and alloys varying from cast iron and steel to aluminum and magnesium alloys.

The almost innumerable parts, their fabrication and heat treatment were dealt with by the speaker and numerous slides showing in detail the application of the various materials in the most complex assemblies were amplified by comment from the speaker.

The exhaustive test procedure required to assure accuracy and guarantee safety in performance was described in a most complete fashion, from the raw material to the finished engine. The talk was followed by active discussion that had to be shortened because of the lateness of the hour.

Humor and Wit Characterize Pearlite Talk

Sauveur Traces Development of Nomenclature of Steel Constituents at Boston

By Amos J. McDuff

Boston Chapter—Celebrating "Sauveur Night" on Oct. 7, the inimitable Dr. Albert Sauveur discussed "Pearlite." In his delightfully humorous and witty talk, the development of the nomenclature of constituents of steels was traced.

The lamellar structure of the pearly constituent of steel was described by Dr. Sorby in 1887. It was not until 1890 that the name "pearlite" was suggested by Dr. H. M. Howe. After Charpy discovered the lamellar structure of eutectics in 1897, pearlite was referred to as a eutectic.

Dr. Sauveur has a letter from Dr. Howe dated June 4, 1903, in a postscript of which is written "Let us use the word 'eutectoid' to denote alloys of the lowest transformation point." This appears to be the first written use of the word eutectoid.

Pearlite, being a eutectic-like constituent, should have a constant or nearly constant composition between 0.8 and 0.9% carbon. The name pearlite should not be applied to constituents containing as little as 0.3 to 0.4% carbon and but partially lamellar.

In 1912 the International Association for the Testing of Materials set up an accepted definition of pearlite. In the 1936 National Metals Handbook of the A.S.M. there is a different definition of pearlite, which Dr. Sauveur contends should not have appeared in any handbook unless as a recommendation of a committee on nomenclature.

When Osmond named troostite and sorbite in 1895, not only did he recognize the progressive character of the transformation of austenite to pearlite, but also he described the occurrence of pearlitic particles in a sorbitic structure. He wrote of the material in which pearlitic particles were embedded "I think that this is a distinct constituent because it cannot be resolved into any two others and I have called it 'sorbite' in honor of the pioneer of metallography."

The coffee talk, given by Grant Wheat of the Koehler Mfg. Co., Marlboro, Mass., on "The Romance of Underground Lighting," proved to be extremely interesting, particularly his valuable collection of lamps showing evolution of lighting from the cave-dwellers through the catacombs period, middle ages and the present.

The attendance at the meeting was exceptionally good and quite a few took part in the discussion.

L. A. Has Magic and Movie

By James Patterson

Los Angeles Chapter began the new year with a dinner meeting held at the Friday Morning Club on Sept. 15.

An interesting highlight of the evening was a varied repertoire of original East Indian and European magic tricks and illusions by Harold Alberti, internationally known magician.

Through the courtesy of the Bethlehem Steel Co., members were privileged to see a very interesting series of sound pictures showing the various engineering problems in the construction of the Golden Gate Bridge and how these difficulties were overcome.

Want a job? Need a good man? Use A.S.M. Employment Service Bureau.

A.S.M. Chapters Sponsor Many Varieties of Educational Activities

Diversity of Subjects Treated Fundamentally or Theoretically in Formal Lecture Courses, Informal Discussion Groups

An annual feature of most chapter activities has become the presentation of educational courses supplementing the regular monthly meetings.

Many of these activities are based on courses available in printed form and accompanied by lantern slides supplied by the National Office of the A.S.M. A new course of this type on "Machinability of Metals," presented at the National Metal Congress, is now ready and is the sixth one to be prepared for such use as this.

The following information, arranged alphabetically by chapter, on the courses so far scheduled should be useful to the membership at large as well as to the educational committees of the various chapters.

BALTIMORE CHAPTER

Baltimore has had the good fortune to obtain the services of Dr. Fred L. Coonan, professor of metallurgy, Postgraduate School, U. S. Naval Academy, to present a series of six lectures on "Fundamental Metallurgy." These lectures are planned as a complete unit and also as a part of a three or four-year program. The subjects and dates are as follows:

Nov. 3—Introductory—Composition of Matter
Dec. 5—Principles of Physical Metallurgy
Feb. 1—Solid Solution Alloys
Mar. 1—Intermetallic Compounds in Alloys
Apr. 1—Bearing Metals
May 3—Brasses

The lectures are open to the public but non-members will be required to pay $2.00 for the course and the notes, while members will pay $1.00.

CALUMET CHAPTER

Two courses will be presented—one on "Heat Treatment" using Grossmann's "Principles of Heat Treatment of Steel" as a guide, and a second on "Steel Making and Shaping." Both courses are presented at Horace Mann Grade School Auditorium, Gary, Ind., at 7:30 p.m. Dates, subjects and lecturers for the two courses follow:

Heat Treatment

Oct. 13—Principles of Hardening; M. Asimow, metallurgist, Carnegie-Illinois Steel Corp.
Oct. 27—Principles and Variations of Hardening; M. Asimow
Nov. 10—The Process of Normalizing; D. Simpson, metallurgist, Carnegie-Illinois Steel Corp.
Dec. 8—The Process of Tempering; R. W. Dickson, metallurgist, Carnegie-Illinois Steel Corp.
Jan. 12—Hot Quenching Operations; J. L. Burns, mill metallurgist, Republic Steel Corp.
Jan. 26—Heat treatment of Case Hardening; O. W. McMullan, metallurgist, Youngstown Sheet & Tube Co.
Feb. 9—Grain Size in Relation to Hardening; Karl F. Schauwecker, metallurgist, Carnegie-Illinois Steel Corp.
Feb. 22—Heat Treatment of Annealing; Roy Allen, field metallurgist, Republic Steel Corp.
Mar. 9—Equipment for Heat Treatment; W. O. Owen, Surface Combustion Corp.
Mar. 23—The Iron-Carbon Diagram; H. B. Wishart, metallurgist, Carnegie-Illinois Steel Corp.

Steel Making and Shaping

Oct. 20—History, Construction and Economy of the Open-Hearth Furnace; V. Gregor, superintendent fuel department, Carnegie-Illinois Steel Corp.
Nov. 3—Charging and Working the Heat; Thad. Lutz, metallurgist, Inland Steel Co.
Nov. 17—Charging and Working the Heat; Thad. Lutz
Dec. 1—Molds, Ingots, Pouring Practice; A. S. Lazlo, general open-hearth foreman, Carnegie-Illinois Steel Corp.
Dec. 15—Effect of Alloying Elements on the Heat and Final Products; Stephen F. Urban, metallurgist, Carnegie-Illinois Steel Corp.
Jan. 19—Stripping, Soaking Pit Practice and Economy; Charles Treat, blooming mill operator, Republic Steel Corp.
Feb. 2—Roll Design and Semi-Finished Products; R. E. Beynon, superintendent roll shop, Carnegie-Illinois Steel Corp.
Feb. 16—Pipe Mills; E. L. Applegate, superintendent pipe mills, Youngstown Sheet and Tube Co.
Mar. 2—Finishing Mills; V. M. Surerus, superintendent roll shop, Inland Steel Co.
Mar. 16—Sheet and Tin Mill Products, Modern Four Highs; John E. Angle, assistant to general superintendent, Carnegie-Illinois Steel Corp. Sheet and Tin Mills

CHICAGO CHAPTER

Educational activities will take the form of a so-called "Fundamental Series" of eight lectures and a "Metallurgical Seminar."

Fundamental Series

The Fundamental Series is confined this year to subjects not often discussed, but which should be of extreme interest to the executive as well as to the man in the shop. The meetings take place at 7:15 to 8:45 p.m. in the Chicago Lighting Institute, Civic Opera Bldg. The first lecture is open to members and guests. Subsequent lectures will be limited to members.

Oct. 27—Where Do You Get Technical Information; S. M. Hull, research librarian, Western Electric Co. and John Crerar Library
Nov. 17—Merchandising of Steel; Griswold A. Price, manager of sales, Carnegie-Illinois Steel Corp.
Dec. 15—Magnetism in Metals; K. L. Scott, electrical engineer, Western Electric Co.
Jan. 19—Significance of Physical Tests of Metals; E. G. Mahin, professor of metallurgy, University of Notre Dame
Feb. 16—Illumination for Inspecting Metal Products; R. G. Raymond, managing director, Chicago Lighting Institute
Mar. 2, 16 and 30—Essentials of Patent Law; J. A. Dienner, president, American Group of the International Association for the Protection of Industrial Properties, and past president, Patent Law Association of Chicago.

Metallurgical Seminar

The Metallurgical Seminar is a course of five round table discussions of metallurgical subjects with particular reference to the more advanced theories. Meetings are held at 7:30 p.m. in the Conference Room, Carnegie-Illinois Steel Corp.

Oct. 6—Effect of Temperature on Metals; J. J. Kanter, Crane Co.
Dec. 1—Corrosion of Metals; J. F. Calef, Automatic Electric Co.
Jan. 26—X-Ray Analysis; Prof. G. L. Clark, University of Illinois
Feb. 23—Controlled Atmosphere; E. G. deCoriolis, Surface Combustion Corp.
Mar. 23—Heat Treatment of Steel; R. S. Archer, Republic Steel Corp.

CINCINNATI CHAPTER

The practice of conducting a series of educational discussion groups is being continued. A "Metal Cutting Group," a group on "Modern Practical Metallurgy" and a "Miscellaneous Group" have so far been organized and have been holding monthly meetings. The groups are open to members and two sustaining representatives.

CLEVELAND CHAPTER

Five separate educational courses of two lectures each will be presented without charge to members of the Cleveland Chapter. All of the meetings are scheduled for Monday evenings and will be held in the lecture room of the Physics Building at Case School of Applied Science.

Course I—Iron-Carbon Diagram

Lecturer—A. Allan Bates, manager of chemical and metallurgical research, Westinghouse Electric & Mfg. Co.

Nov. 14—Interpretation of Microstructures
Nov. 21—Diagram Distortion by Alloying and Heat Treating

Course II—Physical Testing

Jan. 23—Theory; H. D. Churchill, associate professor of mechanics, Case School of Applied Science
Jan. 30—Practice; L. F. Herron, metallurgist, James H. Herron Co.

Course III—Selection of Materials

Feb. 20—Ferrous; H. W. McQuaid, metallurgist, Republic Steel Corp.
Feb. 27—Non-Ferrous; Symposium directed by E. E. Thum, editor, METAL PROGRESS

Course IV—Heat Treatment

Lecturer—Raymond L. Rolf, metallurgical engineer, Lakeside Steel Improvement Co.
Mar. 20—Quenching Rates, "S" Curves
Mar. 27—Mass Effects, Flame Hardening

Course V—X-Rays

Lecturer—Kent R. Van Horn, research metallurgist, Aluminum Co. of America
Apr. 17—Radiography
Apr. 24—X-Ray Diffraction Analysis

DAYTON CHAPTER

In view of the wide divergence of preference expressed by the members as to type and character of educational work to be undertaken, it has been decided to form a few concentrated study groups on special subjects. Each group will be a self-contained unit under its own leadership and providing its own course of discussion.

Work will commence immediately after the first of the year. The groups will be open to members of the Society without charge and to non-members upon payment of a $3.00 fee.

MILWAUKEE CHAPTER

Tool Steels is the subject of the course of five lectures presented by J. A. Comstock and James P. Gill. Meetings are held in Room S-200, Science Bldg., Marquette University, at 7:30 p.m.

The course is free to members of the Society, with a fee of $5.00 to non-members which may be applied on a regular membership within three months' time.

Meeting dates and subjects are as follows:

Nov. 7, 14, 21, and 28—Application, Specification, Inspection, Annealing, Hardening, Tempering, Nitriding, Furnace Equipment and Atmosphere Control; J. A. Comstock, consulting metallurgist, Surface Combustion Corp.
Dec. 5—Recent Developments in Tool Steel; James P. Gill, chief metallurgist, Vanadium-Alloys Steel Co.

MONTREAL CHAPTER

An educational class, limited to 30 members, will be conducted weekly at McGill University. Subject of the lectures is "Iron Founding," and there will be about 12 lectures in the series. Members are admitted at a very nominal charge.

NEW HAVEN CHAPTER

Three lectures on "Copper Base Alloys" and three lectures on "Inspection and Testing Methods" are scheduled on the special lecture program to be given next February and March. The lectures are free to members and will be held in Hammond Laboratory of Yale University at 8:00 p.m.

Feb. 20—Constitution of Copper-Base Alloys; C. S. Smith, Research Laboratory, American Brass Co.
Feb. 27—Fabrication of Copper-Base Alloys; D. K. Crampton, Chase Companies, Inc.
Mar. 6—Application of Copper-Base Alloys; R. S. Pratt, Bridgeport Brass Co.
Mar. 13—Mechanical, Chemical and Metallographic Inspection and Testing Methods; C. D. Coxe, Remington Arms Co.
Mar. 20—Creep, Fatigue, Damping and Impact Inspection and Testing Methods; R. M. Brick, Department of Metallurgy, Yale University.
Mar. 27—Laboratory Demonstration of Testing Methods and Showing of Ontario Chapter's Movie on Testing of Metals; Prof. George B. Colton, Yale University.

NEW JERSEY CHAPTER

An educational course of five lectures deals with subjects of interest in the use, treatment and fabrication of metals. The subjects are covered in an elementary manner and particular emphasis is placed on the practical aspects rather than the theory involved.

The course is free to all members and to two additional representatives of each sustaining member. It is held at Essex County Boys' Vocational School, Newark, N. J., at 7:45 p.m. on Wednesday evenings.

Oct. 26—Corrosion—What Is It?
Nov. 2—Corrosion—How May It Be Combated? F. L. LaQue, International Nickel Co.
Nov. 9—Magnetic Testing; C. A. McCune, Magnaflux Corp.
Nov. 16—Spectroscopic Analysis; T. A. Wright, Lucius Pitkin, Inc.
Nov. 30—X-Ray and Gamma Ray Inspection; Victor Hicks, Westinghouse X-Ray Co., and Sam Tour, Lucius Pitkin, Inc.

NEW YORK CHAPTER

"The Effects of Common Alloying Elements on the Structures and Properties of Commercially Important Metals" is the general subject of 9 lectures offered by the New York Chapter. The lectures are to be held on Tuesday evenings starting Nov. 15.

The first three lectures are devoted to a general review of theoretical and experimental knowledge of alloys. The remaining lectures deal with specific fields to which these principles may be applied.

PHILADELPHIA CHAPTER

As in the past 17 years, the Philadelphia Chapter will cooperate with Temple University in presenting a Practical Evening Course in Heat Treatment and Metallography of Steel. A first year course and an advanced course are offered, with both lecture and laboratory classes. The classes run for 30 weeks with a lecture period of 1½ hr. and laboratory period of 3 hr. each week. Enrollment is limited.

A special evening lecture course will also be offered free to members later on.

PITTSBURGH CHAPTER

The educational program of the Pittsburgh Chapter consists of five groups of lectures on various subjects. The course is free to members of the Society, and non-members may attend for a fee of $5.00, which may be applied toward membership at any time during the course.

All lectures are held on Tuesday evenings at 8:00 p.m. in the Bureau of Mines Auditorium, as follows:

Oct. 25, Nov. 1, and Nov. 8—Metallography; A. Allan Bates, Westinghouse Research Laboratories.
Nov. 15, 22 and 29—Heat Treatment; J. P. Gill, chief metallurgist, Vanadium-Alloys Steel Co.
Dec. 6 and 13—Testing; R. L. Templin, chief engineer of tests, Aluminum Co. of America.
Jan. 10, 17 and 24—Steel Making; W. J. Reagan, assistant superintendent open-hearth department, Edgewater Steel Co.
Jan. 31 and Feb. 7—Welding; C. H. Jennings, research engineer, Westinghouse Research Laboratories.

ROCHESTER CHAPTER

The third year of the three-year course being given by the Rochester Chapter at University of Rochester is devoted to discussion of problems in the foundry, machine shop and tool room. It is not necessary to have attended previous sessions for admission.

Meetings are held at 7:15 p.m. in Room 208 Engineering Bldg., University of Rochester. The course is free to members and junior members; for non-members the fee is $5.00.

Sept. 26—Foundry Terms
Oct. 3—Gray Iron
Oct. 24—Alloy Iron
Oct. 31—High Strength Iron
Nov. 7—Cast Steel
Nov. 21—Cast Brass
Nov. 28—Cast Bronze
Dec. 12—Cast Aluminum
Dec. 19—Machinability
Jan. 16—Machining Problems of Cast Iron
Jan 30—Machining Problems of Cast Steel
Feb. 6—Machining Problems of Cast Brass
Feb. 20—Machining Problems of Cast Bronze
Feb. 27—Machining Problems of Cast Aluminum
Mar. 6—Tool Design
Mar. 20—Tool Treatment
Mar. 27, Apr. 3, 10, 17, 24, May 1—Heat Treatment of Tools

O. H. Practice Described

By James A. Smail

Mahoning Valley Chapter—Speaker at the meeting on Oct. 11 was Wm. J. Reagan of Edgewater Steel Co., who gave a detailed description of open-hearth practice in making medium to high carbon steels.

Mr. Reagan's talk included the type and size of charge, practice in melting, refining, temperature control, tapping, pouring, and ingot mold practice. Many lantern slides were shown to illustrate the interesting phases of his talk.

The meeting was attended by 65 members and friends, who can highly recommend Mr. Reagan as a very able and interesting speaker.

Free Literature — Mail Coupon Below

Refractory Selector

An unusual and extremely convenient and attractive arrangement is utilized by Wahl Refractory Products Co. in an eight-page pamphlet classifying six types of refractories. All the necessary information on properties, operation and use is given in handy tabular form. Bulletin R-188.

Stainless Molding

Catalogs showing a wide variety of Stainless Steel Molding are available through the Carpenter Steel Company. As high as 50% savings are possible through the use of these moldings for which Carpenter furnishes stainless steel. Bulletin Hb-12.

Moly in Steel

Metallurgists, engineers and production executives who are really interested in the metallurgy of steels and their application will want the newly published book on molybdenum steels which has just been released by Climax Molybdenum Company. Bound in loose-leaf manner, this reference book is chock-full of tables which form a volume almost an inch thick. Bulletin Hb-4.

Recuperators

Results obtained with Carborundum Company's recuperators using Carbofrax tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data are given in Bulletin Fx-57.

Seamless Tubes

Just prepared by the Timken Steel and Tube Division of Timken Roller Bearing Co. is a "Guide for Users of High Temperature Steels," which presents technical data relating to the various properties of Timken seamless tubes. Bulletin Bb-71.

Pure Metals

Pure, carbide-free metals are described and applications suggested in a pamphlet published by Metal & Thermit Corp., who make pure tungsten, chromium and manganese in addition to the ferro-alloys. Bulletin Ma-64.

Chromel

A new catalog has been issued by Hoskins Mfg. Co. covering Hoskins electric furnaces and Chromel elements, which provide uniform heat and automatic temperature control with excellent production and quality of work. Bulletin Ia-24.

Salt Bath

"Heating from the inside out" is what makes the Ajax-Hultgren salt bath furnace practical. Ajax Electric Co. explains this new operating principle in an interesting folder. Bulletin Oy-43.

Enduro 18-8 Types

Detailed data on Enduro 18-8 and its several variations are featured in a 24-page book by Republic Steel Corp. which is radically different in layout, photography, and typographical treatment. Bulletin Dy-8.

Mo-W High Speed

J. V. Emmons, metallurgist for Cleveland Twist Drill Co. and largely responsible for the development of the molybdenum-tungsten high speed steels known as Mo-Max, has prepared a general description of these new steels. Bulletin Ka-103.

Beth-Cu-Loy

Two-hundred to two-hundred-and-fifty per cent greater rust resistance at but 4 to 5% extra cost . . . this is the outstanding feature of Behlehem Steel Company's Beth-Cu-Loy. A new folder gives results of tests on this new alloy. Bulletin Ib-76.

Panphot Microscope

A universal microscope with photomicrographic reflex camera is explained in this well-illustrated booklet by E. Leitz, Inc. Points out applications and advantages of this system. Bulletin Db-47.

Duronze

An 80-page technical handbook covering the physical properties and applications of four high strength silicon bronzes pioneered by Bridgeport and sold under the trade name "Duronze alloys" has been released by the Bridgeport Brass Co Bulletin Bb-163.

Alloy Welding

Arcos Corporation has issued its illustrated Technical Bulletin which contains new and previously unpublished information on physical and metallurgical characteristics of stainless and special alloy welding. Bulletin Kb-191.

Technical Paper

Technical data resulting from experiments carried out in Aluminum Research Laboratories is now available through the Aluminum Company of America. "Column Strength of Various Aluminum Alloys" is the newest available. Bulletin Kb-54.

Centricast Boxes

The story of centrifugally cast carburizing and annealing boxes—their reasons for being, method of production, properties, and advantages—is made extremely readable in a folder by Michigan Steel Casting Co. Bulletin Jy-84.

New Joining Process

Metal parts are joined cheaply, neatly and strongly by Electric Furnace Co.'s new, inexpensive non-oxidizing furnace atmosphere and their new, continuous brazing, coppering and soldering furnaces. Full details are given in Bulletin Ar-30.

Abrasive Cleaning

Comprehensive information on airless abrasive metal cleaning is contained in a new book on the "Wheelabrator" Tum-Blast, a patented mechanical device made by the American Foundry Equipment Co. Bulletin Fa-112.

X-Ray Examination

The application of X-ray examination and inspection of castings, welding, and food products, as well as practical X-ray crystal analysis, is completely described and strikingly illustrated in General Electric X-Ray Corp.'s new 34-page publication. Bulletin Dy-6.

Hardness Testing

A 4-page folder which has as its purpose "to give you an idea of how practical a thing it is to make hardness tests on raw stock or fabricated metal parts in all plants where metal is worked, and to suggest something of the necessity for making such tests, or at least their importance" is available through the Wilson Mechanical Instrument Co., Inc. Bulletin Fb-22.

Meehanite

A compact but complete specification chart gives the recommended grades of Meehanite metal for various service requirements. Complete physical properties and applications are included. Bulletin Da-165.

Defi Rust

Analysis and descriptive notes of nine types of heat and corrosion resisting steels made by Rustless Iron and Steel Co. are contained in a handsome folder. Bulletin Ha-169.

Rotoblast

A new blast cleaning machine eliminates the need for compressed air as the abrasive driving agent. Pangborn Corporation tells how a rapidly spinning wheel propels the abrasive by controlled centrifugal force. Bulletin Ox-68.

Grinding Lubrication

A handy outline for the selection of grinding wheels is one of the useful features of a booklet full of facts about grinding solutions. D. A. Stuart & Co. Bulletin My-118.

Tempering Furnace

Technical details and operating data on Lindberg Steel Treating Co.'s new Cyclone electric tempering furnace, which has shown a remarkable performance record in steel treating operations, are given in Bulletin Fx-66.

Hardness Testers

A handy thing to have around for anyone who does much hardness testing is a complete and detailed catalog of the universal line of hardness testers carried by Pyro-Electro Instrument Co., together with information on various specialized pieces of auxiliary equipment. Bulletin Fb-197.

Stainless Data Book

All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc., giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Heroult Furnace

Revised and expanded to include modern major innovations in the construction and operation of the Heroult electric furnace, a new edition of the American Bridge Co.'s Heroult Electric Furnace Bulletin is now ready for distribution. Bulletin Bb-124.

Scleroscopes

Shore Instrument & Mfg. Co. describes its Model D standard recording scleroscope in a recent bulletin which explains the theory and practice of hardness testing with this machine. Bulletin S-33.

Pictorial Story

A pictorial and descriptive story of the manufacture of steel products by the Youngstown Sheet and Tube Co. is in reality a textbook of basic steel information contained in a 115-page, leather-covered pocket size ring binder. Bulletin La-93.

Heat Resisting Alloys

Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Ni-Cr Castings

Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Ingot Production

"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Micromax

The Leeds & Northrup "Silver Anniversary" Micromax is fully described in a pyrometer catalog, in which a real effort is made to help the user to select, from among the models offered, the right pyrometer to meet his specific need. Bulletin Ay-46.

Cinch Steel Cement

How Cinch steel cement saves high speed steel and Stellite by permitting the using up of short pieces is told in a bulletin by Claud S. Gordon Co. Bulletin Ka-53.

Nichrome Containers

The important part that containers play in economical and dependable carburizing is well known to metallurgists and heat treaters. A Driver-Harris Co. bulletin on Nichrome carburizing containers should therefore not be neglected. Bulletin Ca-19.

Dehumidifier

Lectrodryer systems, employing activated alumina for drying air and gases by absorption, are described in an attractively illustrated booklet by the Pittsburgh Lectrodryer Corp., Pittsburgh. Bulletin Bb-187.

Gas Boosters

Spencer Turbine Co. has published for the first time information concerning Spencer gas boosters which have been in successful operation in many plants for several years. They are now standardized for handling all kinds of acid fumes, poisonous, corrosive or explosive gases. Bulletin Na-70.

Optical Pyro

No correction charts, accessories, nor upkeep are required with the Pyro optical pyrometer, which is a totally self-contained direct-reading precision instrument made by Pyrometer Instrument Co., and described in Bulletin Ay-37.

Bessemer Steel

Jones & Laughlin Steel Corp. has for distribution reprints of the paper by C. C. Henning on "Manufacture and Properties of Bessemer Steel" that received the Robert W. Hunt Award of the A.I.M.E. during 1935. Bulletin Ca-50.

Oven Furnaces

In a nutshell American Gas Furnace Co.'s improved oven furnaces offer controlled atmosphere, quiet operation, economy, are over and under-fired and bottom vented. Described more fully in Bulletin Aa-11.

N and Mo in Stainless

A valuable addition to any metallurgist's library is a set of tables giving physical properties of high-nitrogen chromium and chromium-nickel steels and columbium-bearing chromium-nickel steels. Electro Metallurgical Co. Bulletin Da-16.

Cutting Steel

Recommended practices for gas cutting of structural steel are given in a concise and authoritative form by the Linde Air Products Co. Qualification tests for good workmanship from the standpoint of accuracy and smoothness of cuts are also described. Bulletin Dc-63.

Cr-Ni-Mo Steels

A. Finkl & Sons' new catalog is really a technical treatise on chromium-nickel-molybdenum steels for forgings. Pocket size, 104 pages, cloth bound, illustrated by photographs, charts and tables. Bulletin La-23.

Binocular Mike

Extremely wide field, long working distance, and stereoscopic vision are only a few of the advantages cited by Bausch & Lomb for the improved KW wide field binocular microscope. Price list and description of accessories included. Bulletin La-35.

Atmosphere Control

A device manufactured by Brown Instrument Co. and known as the "Analy-Graph" records minute changes in the chemical composition of a furnace atmosphere. How it works is told in Bulletin Ka-3.

Electroplating

A complete group of chemicals, processes and materials of interest to those engaged in electroplating is listed in this 8-page booklet published by the E. I. du Pont de Nemours & Co., Inc. Bulletin Eb-29.

Bristol Potentiometers

All of the Pyromaster Round-Chart Potentiometers manufactured by the Bristol Company are described in a new bulletin which explains the simple operating characteristics of Bristol's Pyromaster. Bulletin Nb-87.

Accelerated Salt

A Technical Service Bulletin just issued by R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co. gives complete details about their new Accelerated Salt. Bulletin Nb-29.

Liquid Carburizing

Fresh off the press, a 32-page booklet containing up-to-the-minute data on Perliton liquid carburizing is now made available by E. F. Houghton & Co. Very helpful. Bulletin Nb-38.

Alloy Castings

The "extra point" value of Michiana alloy castings is shown in a new booklet just released by the Michiana Products Corp. Typical installations are shown. Bulletin Nb-81.

Convection Furnaces

A colorful booklet, "Convection Furnaces for Ferrous and Non-Ferrous Metals" has just been released by the Surface Combustion Corp. Typical installations are shown and explained. Bulletin Nb-51.

Bell-Type Meter

Economical measurement of low-pressure gas with exceedingly accurate results is described in a new booklet issued by The Foxboro Company. Bulletin Nb-21.

Steel Stock List

A handy pocket-size booklet containing an explanation of the change in steel classifications and extras, as well as general data tables, is now available through Joseph T. Ryerson & Sons, Inc. Bulletin Nb-106.

Steel Protection

Attractively printed in copper and black, a new booklet on U. S. S. Copper Steel "A Little Copper In Steel Gives a Lot of Protection" has been published by the United States Steel Corp. Subs. Bulletin Nb-79.

Rust Preventative

How to prevent rust effectively is related in a bulletin issued by the Alox Corporation. Describes their method which is being used successfully in a wide variety of forms. Bulletin Nb-212.

Six Metals

"Six Minutes with Six Metals" is the interesting title of a well illustrated booklet which describes various metals produced by the International Nickel Co. Bulletin Nb-45.

The Review
7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. (Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon.)

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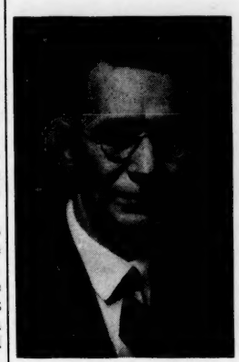
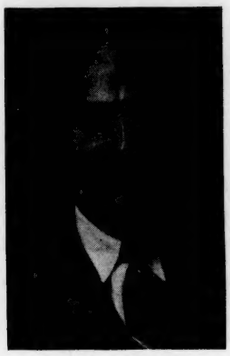
						Nb-29	

HERE AND THERE WITH A.S.M. MEMBERS

A.S.M. Medalists Honored at Banquet



H. W. McQuaid



Joseph Winlock

R. W. E. Leiter

TRYING to find a metallurgist who isn't familiar with the McQuaid-Ehn grain size test is like locating a baseball fan who never heard of Babe Ruth. Few phases of metallurgy are given more serious attention in the making of modern steels than the study of grain size and its control. Probably no other one has contributed more to the store of data on the subject than HARRY WINCHESTER MCQUAID, co-originator of the McQuaid-Ehn grain size test and pioneer metallurgist in the field.

In recognition of these early studies and particularly in recognition of the resulting stimulation to research, Mr. McQuaid was made the recipient of the Albert Sauveur Achievement Award at the annual banquet of the American Society for Metals during the National Metal Congress in Detroit last month.

A graduate of Stevens Institute in 1913, Harry McQuaid spent a year in the engineering department of the United Piece Dye Works and another as sales and installation engineer for the Selas Co. before joining Timken Roller Bearing Co. as night foreman in the heat treating department. In 1917 he was transferred to the metallurgical department and for the next five years engaged in the important research work which resulted in developing the McQuaid-Ehn test.

In 1924, after an interim of two years as manager of the Precision Gear Blank Co., Mr. McQuaid returned to Timken and remained with the Timken-Detroit Axle Co. until 1933. He then joined Republic Steel Co., where he is now assistant chief metallurgist.

The 1922 paper describing McQuaid and Ehn's early work will be reprinted in January METAL PROGRESS.

* * *

ALSO awarded by the A.S.M. at the annual banquet was the Henry Marion Howe Medal for the best paper to appear in Transactions during the preceding year. JOSEPH WINLOCK and RALPH W. E. LEITER were the chosen authors, the title of their paper being "Some Factors Affecting the Plastic Deformation of Sheet and Strip Steel and Their Relation to the Deep Drawing Properties."

JOSEPH WINLOCK has had the privilege of working both under Prof. Albert Sauveur (doing graduate work at Harvard 1919-20) and with Prof. Henry Marion Howe (doing work on the heat treatment of plain carbon steels for the National Research Council from 1920 to 1921). At that time he was assistant metallurgist, U.S. Bureau of Mines. Following a brief period as metallurgist in the laboratory of the Watertown Arsenal, in 1922 he became research metallurgist for Edward G. Budd Mfg. Co. In 1931 he was made chief metallurgist.

The career of RALPH W. E. LEITER somewhat parallels that of senior author Winlock. A graduate of Juniata College in 1927, he likewise did graduate work under Professor Sauveur, obtaining his M.S. from Harvard in 1928 and his S.D. degree in 1930. One summer was spent in the laboratory of Watertown Arsenal and about a year with American Steel & Wire Co. before he joined the Budd Company in 1931. He is research metallurgist.

* * *

A. J. LEGAULT, sales engineer in charge of the Montreal office of the Bristol Co. of Canada, Ltd., has been transferred to the head office in Toronto as sales manager in charge of all Canadian business.

A native of Canada and a member of the Montreal Chapter A.S.M., Mr. Legault was born in Belleville, Ont., and is a mechanical engineering graduate of Queen's University (1921). He has been associated with the Bristol Co. for the past 16 years, and although for a large part of that time he was affiliated with various United States offices, he has also traveled extensively throughout Canada.

For some time he was the company's sales research engineer, engaged particularly in the development of automatic control of hot blast temperatures in blast furnaces and of cycle control for industrial processes.

* * *

BEST wishes of the Philadelphia Chapter accompany GEORGE P. KRAEMER, who left Philadelphia on Sept. 10 for Pittsburgh to take up the duties of vice-president of Edgar T. Wards' Sons Co. He has been employed by that company since leaving school and was manager of the Philadelphia branch when appointed to his new position on July 1.

Mr. Kraemer has long been a member of the A.S.M. and has been very active in the affairs of the Philadelphia Chapter, resigning as treasurer upon being transferred.

* * *

HAROLD E. TRENT has just cause to be proud of his son, EDWARD M. TRENT, both members of the Philadelphia Chapter. Trent Jr. received his Ph.D. degree from Sheffield University in England last July, and for one year has been employed by the British Government as metallurgical member of the Wire Rope Committee. Now only 24 years of age, he was awarded the Mappin Medal for metallurgy of Sheffield University in 1933 and the Brunton Medal in 1934. He is also co-author of a paper with Prof. J. H. Andrew on "Quench Aging of Steel" for the Iron and Steel Institute.

* * *

ROBERT F. KIMBER, past chairman, Rochester Chapter, has accepted a position at Mechanics Institute, Rochester, N. Y., teaching a class in hardening and tempering of tool steel—the only such class in any school in New York State.

According to Mr. Kimber, a shortage in skilled mechanics caused by the depression has made it necessary for manufacturers to rely on schools for the teaching of trades. Students learn by actually doing the tempering. They must have at least two years experience in machine shop practice to be eligible for the steel heat treating course.

Mr. Kimber is a tool steel salesman for Firth-Sterling Steel Co.

* * *

GOLDEN Gate Chapter lost its chairman last September when VICTOR J. MINNER was selected by his company, Standard Oil Co., to go abroad for a period of three years' service. Vice-Chairman J. P. HAHIR, Schlage Lock Co., has taken over the duties of chairman, while J. G. MCCALLUM will be in charge of educational activities.

* * *

CARL W. HORACK, long-time reporter to THE REVIEW of Golden Gate Chapter meetings, has left the faculty of University of California and is now connected with the Merco-Nordstrom Valve Co., Oakland, Calif., as assistant engineer.

DIED

AXEL HALVORSEN, McCormick Bros. Co., Albany, Ind., Oct. 4 (past chairman, Muncie Chapter).

WALTER B. HOPKINS, president, Circular Tool Co., Inc., Providence, R. I., August 15 (Rhode Island Chapter).

CHARLES STEVENS, experimental engineer, Thompson Products, Inc., Detroit Plant (Detroit Chapter).

Bain's "Hardenability" Is "Snow White" To A.S.M. Members and Steel Treaters

By Walter M. Saunders, Jr.

Rhode Island Chapter—On Oct. 5, after waiting patiently for almost two years, the Chapter finally had the opportunity of hearing Dr. E. C. Bain's classic lecture on "A Simplified Concept of Hardenability in Steel."

During this long wait, it was rumored many times that "Doctor" Bill Eisenman was willing, and fully prepared, to give the talk, because he claims to have heard it on 30 occasions, while accompanying Dr. Bain on his presidential tour of the various chapters. Be that as it may, the subject is one of utmost interest to steel treaters, and like the movie "Snow White," something different is observed each time it is seen, or heard.

No attempt is made, therefore, to report the lecture itself, other than to state in Dr. Bain's own words, that it is the old story of Quench and Draw, but with the ambiguities of hardening explained by a study of the fundamental reactions of the hardening process.

What Dr. Bain modestly refrained from saying was that such a study consumed a tremendous amount of time and effort, and that it required capable direction and intelligent interpretation to arrive at the ultimate results that Dr. Bain so ably described.

The question period afterwards brought out several interesting points. For instance, the wavy surface on tool steel jewelry dies, described as similar to the welt raised on a horse with a whip, was attributed to improper atmosphere. It was stated by one of the audience that this phenomenon is observed in gas and oil furnaces, where the atmosphere is under pressure.

Quick Annealing Questioned

A second question concerned quick annealing of thin gage 0.90% carbon steel, as in a continuous furnace. It was Dr. Bain's opinion that such a procedure would not result in quite as low B Rockwell, as the old pot heating over night. Whether the forming or bending qualities would be impaired by quick annealing was open to proof one way or the other, and no one present ventured a suggestion on this aspect.

Finally, the anomaly of a surface soft to the C Rockwell, and yet hard to the file, was discussed. Two explanations were advanced, the first being that retained austenite on the surface could be responsible, and the second that in some circumstances extra surface carbon enhancing the preservation of austenite might allow the diamond to penetrate, but support the file.

Preceding Dr. Bain's talk, the Chapter successfully resumed a long abandoned practice of having a dinner, and following the prevailing custom, threw in a coffee talk for good measure. Sergeant E. S. Crowley of the Detective Division of the Providence Police, very ably and entertainingly described "Crime Detection and G-Men."

Story of Steel Given In Sound-Color Film

(Continued from page 1)

sult may well establish a demand for similar pictures in the future.

The film shows the various processes in the manufacture of steel from the mining of the ore to the melting of steel in the Heroult furnace. Each step is explained by the narrator, Edwin C. Hill.

Many of the details involved in the manufacture of steel have been neglected heretofore. Here the whole story is told in a manner that makes the process understandable to the average man.

The vivid coloring associated with open-pit mining is brought to the theatre, and it is easy to see and understand iron in its natural state. The camera shows the great lake freighters and the method of loading and unloading the rich iron ore.

The tapping of the blast furnaces becomes real with the sparkling stream of brilliant yellow metal as it is poured into ladles for transferring to the bessemer convertors. And the bessemer convertors put on the finest show in the saga of the steel mills with the ever-changing color of the flames issuing from the mouth of the convertor.

The open-hearth furnace comes in for its share of attention, although the melting down of the charge in the electric furnace is one of the most interesting spots in the picture.

The pouring of the ingots is so real that the audience could imagine itself on a platform overlooking the scene.

All the beautiful coloring of the steel mills during the rolling of the ingot is shown, and scene after scene depicts graphically the various processes involved. So complete is the film that the most complicated process seems almost simple.

The story of steel can never be told completely on film, but this picture goes far toward being one of the finest industrial records ever made.

Cincinnati Discussion Group Studies Cutting Tool Action Seen Through Microscope

(Continued from page 1)

easily disposed of, is formed by segments. The pitch of these segments depends upon the condition of operation and the material being cut.

The conditions which favor the formation of type 1 chip are brittle material, large chip thickness, low cutting speed, and small rake angle.

Where the pitch of the segments is small a good finish is produced on the work piece. With this type of chip, tool failure occurs by a rounding over and wearing away of the cutting edge.

The type 2 chip is obtained when machining ductile materials and it is characterized by the absence of the built-up edge.

The conditions which promote the formation of the type 2 chip are ductile material, small chip thickness, high cutting speed, large rake angle, keen cutting edge, optimum temperature at the tool point, and minimum opposition to chip flow over the tool face.

Type 2 for High Quality Finish

When high quality of finish is desired, the type 2 chip should be the goal.

With the type 2 chip, tool wear occurs partly by abrasion of the face close to the cutting edge, and partly by a rounding over and wearing away of the cutting edge itself.

In practice, particularly when machining low carbon steel with high speed steel tools, the type 3 chip is obtained.

Owing to the high friction between the material of the chip adjacent to the tool face, and the tool face, a layer of material usually remains anchored to the tool face to form a built-up edge, while the chip body shears away from it and passes off above. This layer of material adhering to the tool face in the portion near the cutting edge is still continuous with the work piece; thus each increment of the latter causes an additional piling up of compressed material in this region.

The grains of the material are elongated in a direction substantially parallel to the tool face.

This built-up edge, as it increases in size, becomes unstable and when failure occurs, fragments thereof are torn off and escape both with the chip and work piece.

These fragments constitute the so-called roughness of the machined surface.

At the end of the cut, when the chip leaves the tool, it usually carries with it the remnant of the built-up edge which has been anchored to the cutting edge.

Under certain conditions, however, the bond between this remnant and the tool face is so great that it remains permanently attached to the tool. This is the condition generally referred to by shop men as "build-up."

With the type 3 chip, the tool wear occurs both by cupping or cratering of the tool face a short distance back from the cutting edge at the point of contact with the chip, and by abrasion of the tool flank due to contact with the fragments of built-up edge escaping with the work piece.

With continued use, the crater extends closer and closer to the cutting edge until failure occurs by spalling or splitting of a portion of the material in this region.

The finish produced under the conditions in which the type 3 chip results is poor due to the presence of the fragments of the built-up edge.

Type of Chip May Be Altered

While one particular type of chip is most likely to be encountered with one material, under different operating conditions of chip thickness, temperature, lubrication of tool face, etc., we may change from one type of chip to the other even though the work material remains the same.

Motion pictures were also shown to illustrate the effect of a fluid on the formation of the chip and the finish obtained when the work piece is machined under different temperatures.

In concluding his talk, Mr. Ernst said that although we can now form a better picture of chip formation under various conditions, much additional work must be done before our knowledge can be used so as to provide optimum results in machine output, finish and tool life.

The meeting was well attended and a very interesting discussion followed Mr. Ernst's talk. The material which was presented formed a valuable and timely introduction to the activities of the "Metal Cutting Group" for the year just begun.

The Latest Book on

MACHINING OF METALS

Consisting of five lectures on machinability delivered at the Detroit National Metal Congress

by

Hans Ernst, Director of Research, Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinnati.

J. W. Bolton, Chief Chemist and Metallurgist, Lunkenheimer Co., Cincinnati.

Harry B. Knowlton, Metallurgist, International Harvester Co., Chicago.

A. H. d'Arcambal and W. E. Bancroft, Metallurgists, Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn.

Harry P. Croft, Chief Metallurgist, Chase Brass & Copper Co., Cleveland

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This new book on machining of metals contains 177 pages of facts about cutting tools, classes of chips, and machinability of wrought, cast and nonferrous metals as well as tool steels.

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GRADUATE B.S. in chemical engineering with one year elective in metallurgy. 1½ years experience chemical plant and laboratory; background of general steel practice and engineering. Desires permanent connection central or southeast part of Pennsylvania. Willing to study. Age 25; single. Box 11-5.

METALLURGIST OR ASSISTANT: Thorough knowledge and experience in converter steel, gray iron, and bronze foundry practice. Also heat treating, forging, testing of materials, control of processes. Practical ability. Box 11-10.

TECHNICAL SALES OR METALLURGICAL DEVELOPMENT: B.S. University of Notre Dame; age 29. Industrial following in southern Ohio and Indiana, inclusive of machine tool and automotive accounts. Knowledge of ferrous metallurgy and metallography. Further details upon request. Box 11-15.

ASSISTANT METALLURGIST: Age 23; B.S. metallurgy M.I.T. 1937. One year experience in the metallography and corrosion problems of chromium and chromium-nickel stainless steels. Preferable location in the East but will go anywhere. Box 11-20.

ASSISTANT METALLURGIST: B. Met. E., M.Sc. Six years plant and laboratory experience in seamless steel tubing. Experience in routine analysis, physical testing, metallography and heat treatment. Four years non-technical office experience in a supervisory capacity. Desires investigation, business or production position in steel industry. Middle west preferred; salary of secondary importance. Age 36. Box 11-25.

METALLURGICAL ENGINEER: Two years welding experience; desires employment in the welding industry. Production work preferred; available immediately; location immaterial. Box 11-35.

SALES AND SERVICE ENGINEER: Metallurgical engineer, steel mill trained; 12 years experience in sales and practical service to steel mills and allied industries. Particularly successful in the introduction, sale and servicing of new products. Salary or contract basis. Box 8-15.

PENN STATE GRADUATE: B.S. in Metallurgy, '38, desires metallurgical production control or sales work. Any location in East or Middle West satisfactory. Box 11-30.

SALES ENGINEERING or laboratory work desired by Case graduate (1936, B.S. in Metallurgy). Two years experience with manufacturer of heat treating materials in laboratory, field service and selling. Box 11-40.

METALLURGIST: Ph.D. Seven years teaching experience, 12 years experience as research metallurgical chemist and chief metallurgical chemist in an industrial plant. Experience in fabricating carbon and stainless steels. Box 11-45.

TECHNICAL GRADUATE: B.S. in chemistry and mathematics, 1936. Experience as research metallurgical engineer and as melter's helper, molder, chipper and grinder on electric furnaces. Would like position as laboratory assistant to metallurgist or chemist. Excelled in mathematics in college. Box 11-50.

MECHANICAL ENGINEER: B.S. Worcester Polytechnic Institute, 1938. Would like to secure work pertaining to physical metallurgy, heat treating and forge work. Box 11-55.

CHAPTER CALENDA

DECEMBER

Baltimore	Dec. 19	.....	S. J. Cort	.....The Metallurgist in Ind
Boston	Dec. 2	Mass. Inst. Tech.	G. C. McCormick	.....Heat and Corro Resisting Alloy Ca
Buffalo	Dec. 8	Hotel Buffalo	C. C. Nitchie	.....Spectrosc
Calumet	Dec. 13	Woodmar Country Club, Hammond, Ind	E. C. Bain	.....Grain Size and Norma
Chicago	Dec. 8	Medinah Club	J. D. Armour	.....Machinabil
Cincinnati	Dec. 8	Hotel Alms	A. B. Kinzel	..Specific Effects of Alloys in Ste
Cleveland	Dec. 5	Cleveland Club	Gregory J. Comstock	.....Powder Metallur
Columbus	Dec. 6			
Dayton	Dec. 7	Engineers Club	A. B. Kinzel	.....Effects of Alloys in S
Detroit		.....		Christmas P
Hartford	Dec. 13	Endee Club, Bristol	C. F. Smart	.....Bearin
Indianapolis		.....		Production Carburi
Lehigh Valley	Dec. 2	Hotel Traylor, Allentown, Pa.	Hans Ernst	.....Physics of Cas
Milwaukee	Dec. 15	Milwaukee Athletic Club	H. W. McQuaid	....Processing of Heat Tr Steels and Their Applicat
Montreal	Dec. 5	.....		Pyrom
New Haven	Dec. 8	Taft Hotel, New Haven..	Henry M. Heyn R. F. Newell	.....Symposium on Fur
New Haven	Dec. 16	Seven Gables Inn, Milford, Conn.		Christmas P
New Jersey	Dec. 19	Essex House, Newark		Smo
North West	Dec. 8	Minnesota Union, Univ. of Minn.	H. W. Graham	.....Machinab
Notre Dame	Dec. 14	Engineering Auditorium, Univ. of Notre Dame ..	Earle C. Smith	.....Steels of Our T
Ontario	Dec. 2	Toronto	R. Sergeson	.....Metallurgical Service Modern Alloy St
Philadelphia	Dec. 2	Engineers Club	J. R. Vilella	.....Metallographic Techni
Philadelphia	Dec. 16	.....		Social Even
Pittsburgh	Dec. 8	Roosevelt Hotel		Christmas Par
Puget Sound	Dec. 7	Engineers Club, Seattle, Wash.	Jack Sender	.....Brass, Bronze and Rel Allo
Rochester	Dec. 8	Strong Auditorium, Univ. of Rochester ...	Hans Ernst	.....Machinab
Rockford	Dec. 14	.....		Weldi
Saginaw Valley	Dec. 13	Detroit		Christmas Par
Springfield	Dec. 19	Hotel Worthy	H. W. McQuaid	.....Carburizing St
St. Louis	Dec. 16	York Hotel		.....Heat Treating of Machine P
Tri-City	Dec. 13			
Washington	Dec. 12	Auditorium, Interior Dept.	J. J. Crowe	.....Flame Cutting, Flame Har ening and Flame Soften
Worcester	Dec. 14	Sanford Riley Hall, Worcester Polytech. Inst.	Norman Stotz	....Modern Trends in Tool St